

A life cycle analysis of consumption taxes from the perspective of equity*

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Abstract

Governments should take equity criteria into account in taxation. According to equity criteria, those who have more ability to pay ought to pay more. The classical studies use static approaches for examining whether a tax system meet equity criteria. The impact of tax policies may differ according to age and income groups in the long run. For this reason instead of annual static methods, dynamic analyses are suggested which take the long run impacts into account. This study examines whether consumption taxes meet equity criteria by using a dynamic method, life cycle model, in the case of Turkey. The findings show that there is a positive relationship between lifetime tax burden and income. This finding is contrary with the mainstream approach suggests that consumption taxes are regressive. Based on this finding it could be suggested that consumption taxes are progressive in the long run and they promote vertical equity.

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1. Introduction

Taxes are collected not only for financing public expenditure but also for economic and social reasons (Brown and Jackson, 1990, 297). In order to achieve fiscal, economic and social goals countries employ different tax policies and tax burdens are adjusted accordingly. So taxes have both financial and non-financial functions. Fiscal functions of taxes are called traditional functions while non-fiscal functions are called new functions. Principles of taxes indicate characteristics of taxes to reach fiscal and non-fiscal goals. Since Adam Smith there have been extensive discussions about the characteristics of an ideal tax system. An ideal tax system should have two main equity principles. First, taxes should increase vertical and horizontal equity. Second, taxes should consider taxpayers' sacrifice.

Tax tariffs try to promote equity by using minimum income allowances, exemptions and taxing income differently according to income sources. A progressive tax is collected according to ability to pay criteria, taxpayers with more income taxed by increasing marginal tax rates. These policies would reduce inequality in income distribution in the society. As indicated by Musgrave (1976) one of the economic functions of governments is the redistribution of income among the society. In line with this policy, governments collect higher taxes from taxpayers with high ability to pay taxes and distribute to the individuals with low income through public expenditures in order to provide more equal income distribution. This is a positive effect of taxes on income distribution. On the other hand, taxes also have negative effects on distribution of income. While governments try to reduce unfair income distribution through taxes, some taxes may play a role on the opposite direction. For example, consumption taxes do not take into consideration the criteria of ability to pay, as a result, taxpayers with low income may carry a tax burden same as taxpayers with a high income groups. Therefore, in the short run consumption taxes may affect income distribution adversely. In some cases, consumption taxes are paid by both buyers and sellers.

Countries consider equity in their tax systems. This implies that taxpayers who have higher ability to pay should pay more. The classical studies use static approaches for examining whether a tax system meet equity criteria. The impact of tax policies may differ according to age and income groups in the long run. For this reason instead of annual static methods, dynamic analyses are suggested which take the long run impacts into account. This study examines whether consumption taxes meet equity criteria by using a dynamic method, life cycle model in the case of Turkey. The following part of this study explains the theory of life cycle model. An empirical study of consumption taxes by using life cycle model is conducted and findings are presented in part 3. Concluding remarks will be the last part of this study.

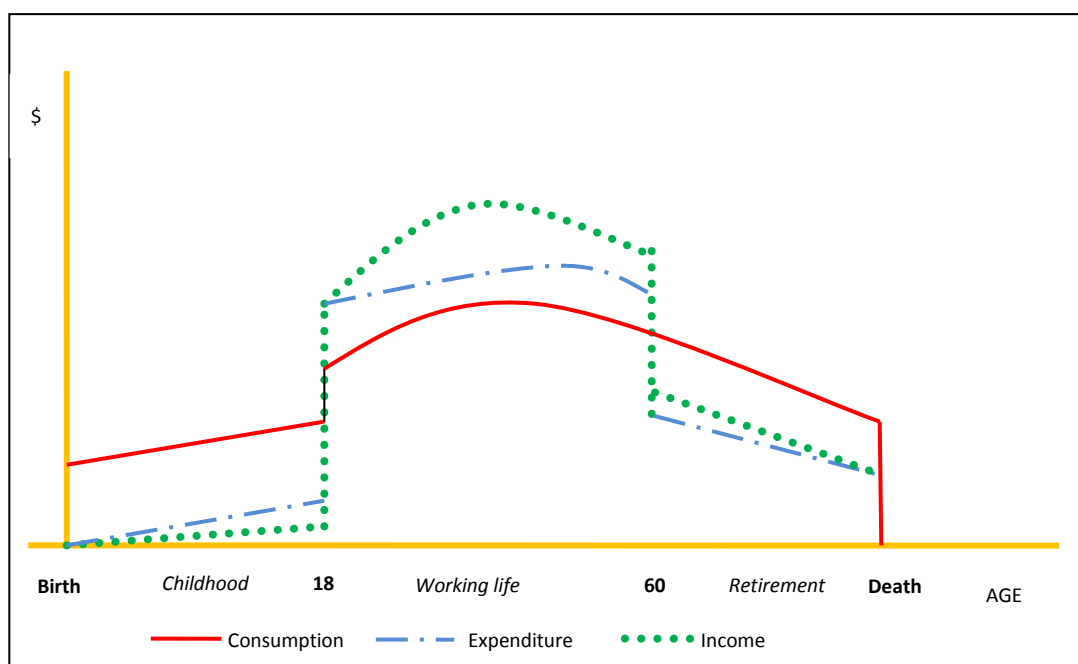
2. The theory of life cycle model

The life cycle model measure basically treats household/person as a living unit and takes its age into consideration in the analyses of the changes it encounters. This measure seeks an answer to the question “how does a family spend during different periods of its life?” and provides some insight to the social and economic events surrounding the family. In fact, several individual life cycles are embedded in the life cycle of a family and naturally they interact. The model emphasizing the differences in an individual’s income, expenditure and consumption patterns during his or her life span is called life-cycle model. The works of Modigliani and Brumberg (1954) and Ando and Modigliani (1963) are accepted as pioneering life cycle works.

In the standard economic theory, it is accepted that individuals spread their lifetime income over their needs throughout their lives (Fennel, 2006, 144). People’s income and consumption are dependent on what stage they have reached in their lifecycle. As shown in the figure below, a person’s life could be divided into three sections: childhood, working life and retirement. Clearly, these periods differ for each person. For instance, one person’s working period starts at the age

of 20, the other's at the age of 25. In childhood, people can spend only pocket money granted to them by their parents. Only after they start working, their earned income, spending and consumption increase rapidly. Later on, they have saving in preparation for retirement, during which a drop in income, and hence consumption, is expected (Connolly and Munro, 1999, 246).

Figure 1: Life cycles



Source: Connolly ve Munro (1999, 247)

Life cycles model provides new insights into the outcomes of public policies. The evaluation of the Medicare program of USA changes when this model is employed as an example. Low-income people from each age group benefit from the program more than high-income people. However, the fact that high-income people live longer on average is considered the result cited above is revised: High-income people might benefit more from the program. This shows that the results of an evaluation on annual basis of a public intervention are likely to change when a life-cycle or dynamic perspective is employed. Thus, it is argued that a better

insight in to the welfare effect of a public program is likely to be achieved when a life-cycle perspective is employed (Poterba, 2002).

A tax having progressive tax schedule may not result in increase in tax as income increases (and vice versa). For example, personal income tax in Turkey has progressive tax schedule and value added tax has a flat rate.

The studies on the optimal taxation using life-cycles reach different conclusions from those using conventional methods. In their theoretical work using life-cycle model, Erosa and Gervais (2002) argue that in order to tax optimally individual income taxes on labor and capital should take age into consideration. Based on its findings, Chamley (1986) suggests that in the long run optimal tax rate on capital should be zero. Alvarez *et al.* (1992) using life-cycle model conclude that the optimal rate must decrease as age increases.

Some studies employing life-cycle model have also searched for the lifetime burden of consumption taxes which typically have proportional tax schedule. Using household consumption data, Caspersen and Metcalf (1993, 1994) examine whether Value Added Taxes would be progressive in the USA and compare annual and lifetime incidence measures. Contrary to the finding from annual perspective which states that a VAT would be regressive, they find that a VAT would be progressive by employing lifetime perspective. The empirical studies by Musgrave *et al.* (1974), Pechman (1985), and Brashares (1988) find that consumption taxes with proportional rates are regressive. The findings from Poterba (1988) suggest that excise taxes are regressive when people's income is considered and proportional when their consumption is considered. A wide literature survey on the topic is provided by Fullerton and Rogers (1993).

Conventional models doing snapshot analyses of the effects of tax policies have been criticized. The fact that income flows do change in time gives rise to this criticism. Consider the case where one of the two persons having the same

lifetime income receives most of the income in the earlier period of his working years and the other's lifetime income flows spread over his entire working years. It does not seem sensible to expect tax system to treat the two in the same manner just because they have the same lifetime income. The net present value of earlier income would be greater than later one. Hence, based on this fact it is argued that a healthy tax policy should possess a lifetime perspective (Guran and Oguz, 2010: 95).

3. Empirical analysis

3.1. Methodology and data

According to equity criteria, those who have more ability to pay ought to pay more. Tax equity is divided into two: horizontal and vertical. In horizontal equity, taxpayers with equal ability to pay should pay the same amount. In vertical equity, taxpayers with more ability to pay should pay more. Any tax system should promote vertical and horizontal equity mutually to meet optimal taxation criteria. For vertical equity, progressive tax tariff should be implemented. The relationship between tax rate and tax base is examined to decide whether a tariff is progressive. Average tax rate is computed by dividing tax to income. If there is a positive relationship between average tax rate and tax base, the tax tariff is progressive. The implementation of progressive tax tariff is possible in direct taxes such as income tax. It is very difficult to use progressive tax tariffs in indirect taxes (e.g. VAT) due to tax avoidance concerns in indirect taxes. For this reason, indirect taxes have flat rates which do not promote vertical equity. Yet, the outcomes of indirect taxes may differ from this theoretical expectation. If a research confirms that the tariff of indirect taxes (consumption taxes) is progressive rather than being flat, it could be suggested that indirect taxes promote vertical equity, too. Under the lights of this suggestion the aim of this study is to examine whether consumption taxes have progressive tax tariff outcomes or flat by using life cycle model.

Life-cycle model requires almost impossible task of following all life spans of individuals. To overcome this difficulty consumption and income data of individuals at different ages and calculated tax liabilities of those will be compared. This would give an idea on how lifetime consumption, income and tax burden would evolve.

The data used in this study are from 2006 Consumer Expenditure Survey (CEX) gathered by the Turkish Statistics Office. The CEX is one of the major sources providing information on expenditure patterns, living standards and income levels by socio-economic groups and urban-rural settlements and regions.

The CEX is conducted on 720 sample households each month totaling 8640 in a given year and provide information on the following indicators for the entire country as well as urban and rural settlements:

- Consumption expenditures, distribution of consumption expenditures by different criteria including household size and type,
- Socioeconomic characteristics of households,
- Employment status of household members,
- Households' income
- The sources of households' income.

The CEX has a variety of information on income and expenditure to be used in this study. It provides raw data not only on the income and expenditure characteristics of the households but also those of its members. In order to get useful information from the survey what is needed is data mining. Moreover, The CEX is longitudinal making it possible to follow the changes in households' expenditure patterns and income sources.

This study aims to show how (consumption) tax burden is affected by life-cycles. However, the CEX does not include consumption tax data. To overcome this

deficiency we will use consumption tax proxies which will be computed from nominal expenditure figures that include taxes. The CEX provides 199 items of expenditures. 74 of 199 are the most important expenditures. Value added tax and excise tax are levied on different expenditures. Total consumption tax of each person for 74 items is calculated by computing either value added or excise tax based on its legislation for each expenditure and then summing taxes for each person. Tax burden of a person's is computed by dividing consumption tax to income. Several figures are prepared to show the relationships between tax burden and income, age.

A study of life cycle model requires that entire life of samples should be observed. This is nearly impossible in social sciences. To overcome this problem, as it is used in preceding empirical literature this study examines and compares the spending and tax burdens of different age groups. The ultimate aim of this approach is to explore the trend of life time tax burden and its determinants.

Consumption taxes decrease while income increases. The impact of this inverse relationship between consumption taxes and income on vertical tax equity is negative. The following imaginative figures shows this inverse relation

	<i>tax base</i>	<i>tax rate(%)</i>	<i>tax</i>	<i>income</i>	<i>Tax burden = tax /income</i>
<i>Tax payer A</i>	10.000	10	1.000	5.000	%20
<i>Tax payer B</i>	10.000	10	1.000	15.000	%6
<i>Tax payer C</i>	10.000	10	1.000	25.000	%4

Above table indicates that theoretically there is a negative relationship between income and tax burden (average tax rate). If life cycle analysis results a finding contrary to this theoretical expectation, consumption taxes have similar impact with taxes with progressive taxes although they have flat rates.

In sum, the mainstream public finance approach suggests that consumption taxes are regressive implying that those having low income bear higher tax burden.

Share of the taxes on expenditures has gone up in Turkey since 1980s. The share now is very high, about 70 percent. Comparing this share with 30 percent share in 1980s, conventional public finance literature tends to claim that regressivity in Turkish Tax System has increased. However, if taxes on expenditure like VAT are found to be progressive or not as regressive as it seems at first in the long run (as in the studies due to Caspersen and Metcalf, 1994; Metcalf, 1996; Jenkins et al., 2006) then this would be contrary to the claim of high degree of regressivity in the Turkish Tax System. This study will explore the degree of progressivity or regressivity of consumption taxes.

3.2. Findings

After excluding outliers and the other data with some obstacles, 7591 people's data are examined. The descriptive statistics are shown in the following table.

Table 1: Descriptive statistics

	N	Mean	Minimum	Maximum	Std. deviation
monthly consumption, TL	7591	1254,5	69	13289	955,5
monthly income, TL	7591	1347,6	64	14476	1022,8
income/consumption, %	7591	114,3	9,07	683,9	47,3
nondurables consumption /total consumption, %	7591	98,9	46,2	100	3,8
durables consumption /total consumption, %	7591	1,03	,00	48,4	3,5
monthly consumption taxes, TL	7591	220,2	5	2149	186,5
consumption taxes /total income, (tax burden)%	7591	17,7	5,5	69,4	10,3

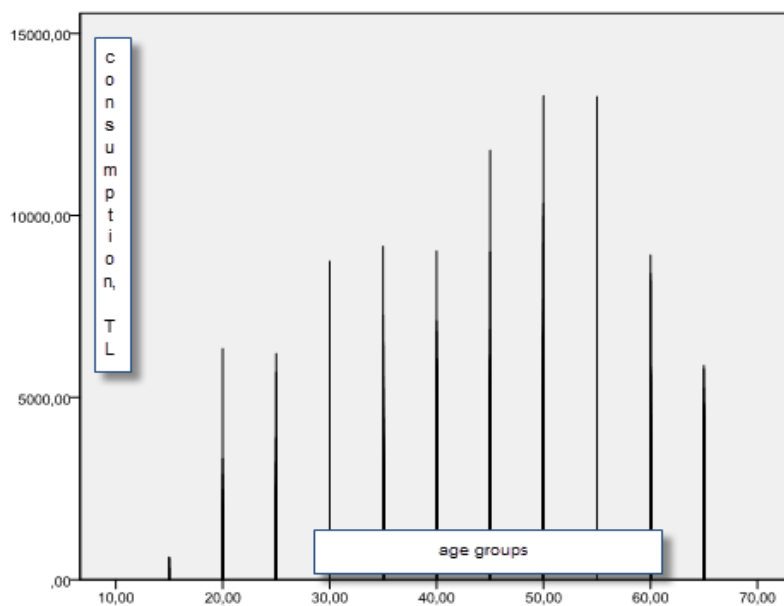
As can be seen from Table 1, while monthly consumption is TL (Turkish Lira) 1245, monthly income is TL 1347. The average rate of income to consumption is calculated as 114 %. Families spend less than their income. Non-durable goods consumption consist of 98,9 % consumption, while durable goods consist 1,03 %.

Average monthly consumption tax (VAT and excise taxes) paid is TL 220.

Average consumption tax burden is 17,7 %.

Average monthly spending according to age groups is shown in the following figure. The highest consumption is in 50 years age group and start to decline after 55.

Figure 2: Spending and life cycles



The amount of tax given according to age groups is indicated in figure 3, the age group 50-60 pay on average TL 249 which is the highest. Figure 3 and 4 gives the relationship between consumption taxes paid for durable and un-durable goods and life cycle. As expected by theory consumption taxes paid depend on life cycle, it increases up to age 50 and start to decrease again.

Figure 3: Consumption taxes and life cycles

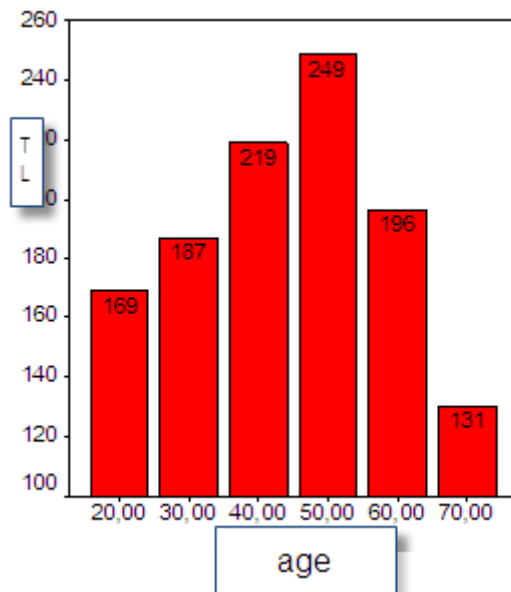


Figure 4: Consumption taxes (non durables) in nominal terms

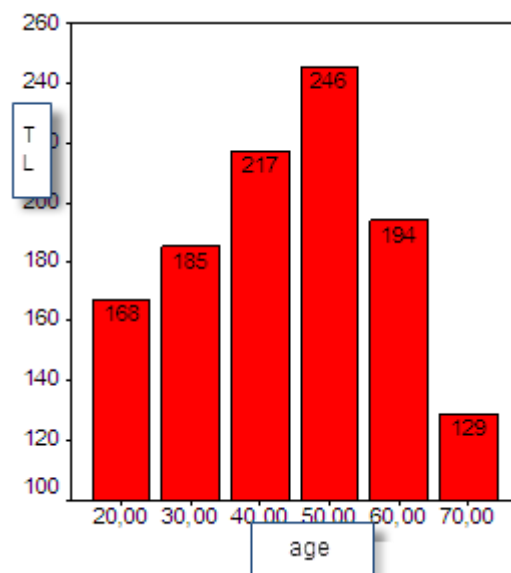
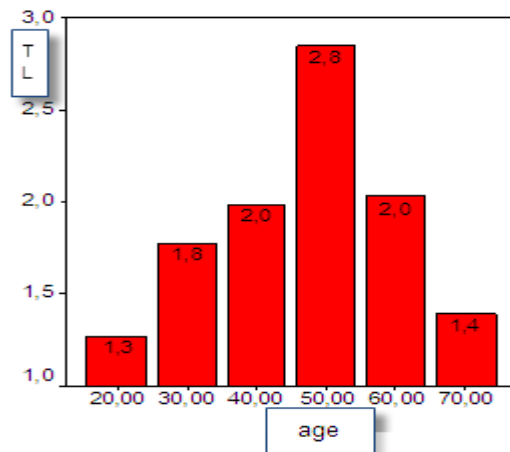
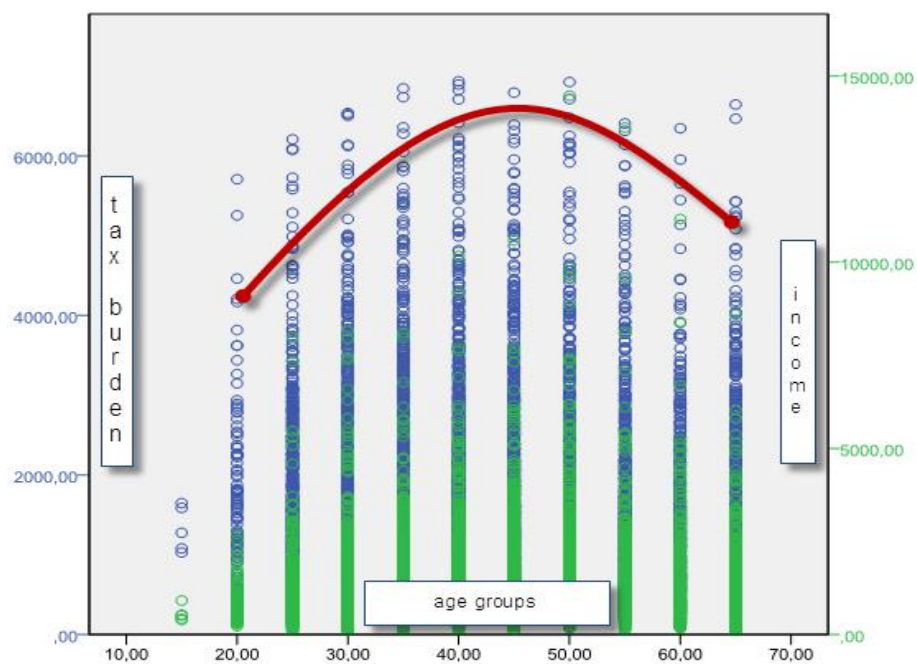


Figure 5: Consumption taxes (durables) in nominal terms



The relationship between life cycle, income and tax burden can be seen in the following figure 6. Left and right vertical axis shows tax burden and monthly income, respectively. Horizontal axis in the figure shows age groups. It could be seen from the figure that there is a positive relationship between income and tax burden in the long run.

Figure 6: Tax burden, income and life cycles



In the light of this empirical finding, it could be suggested that that consumption taxes are progressive like income taxes and can affect vertical equity positively. It is accepted in theory that there is a negative relationship between income and tax burden (average tax rate) in taxes with flat tariffs such as consumption taxes. The life cycle analysis conducted in this study results a finding contrary to this theoretical expectation, consumption taxes have similar impact with taxes with progressive taxes although they have flat rates.

4. Concluding remarks

In the long run, tax policies may affect people differently depending on age and income groups they belong to. Thus, instead of static analyses, it is important to do dynamic analyses of tax policies so that these policies would be sustainable and successful. In dynamic analyses, a person's age and income are taken into consideration to see how taxes affect well beings of the taxpayers in different age and income groups. Life-cycle approach to tax incidence makes this kind of analysis possible.

With employing life cycle model to tax concept, a new perspective has been achieved in analysing tax fairness. Some of the predictions of the life cycle model which should be tested** by empirical models are as follows; it can be claimed that an income tax which is applied on capital earnings could be unfair. Taxing this kind of income is highly related to not only life time opportunities to consume but also related to timing of consumption. For two individuals with same amount of life time income, a general consumption tax or income tax on wages are the ideal ways of life cycle taxing method. How these two individuals allocated their consumption in their life span should not change the tax burden. If we consider budget constrain in the life cycle model, the amount of wage taxes would be same

** Some of the predictions of the model are tested empirically in some countries such as USA. We have to take into considerations that findings can differ from one country to another and also from time to time.

as consumption taxes in real current value (Rogers, 2005). On the other hand, timing of income tax on wages and consumption taxes are different. While consumption tax can be flattened, wage tax cannot be, wage tax increases by age and drops significantly by retirement. Therefore, if governments employ consumption tax rather than income taxes, older people would be affected more negatively, since older generation have paid more taxes when they were young compare to current young generation [Auerbach ve Kotlikoff (1987) cited by Rogers (2005)].

This study aims to show how equity in taxation is affected by life-cycles. The data used in this study are from Consumer Expenditure Survey (CEX) gathered by the Turkish Statistics Office. The figures that are based on the CEX show that consumption taxes are progressive to some degree. This finding is contrary with the mainstream approach suggests that consumption taxes are regressive. The share of consumption taxes to total tax revenues is more than 70 percent. Based on the fact that the conventional public finance literature tends to claim that regressivity in Turkish Tax System has increased. The validity of this claim could be rejected based on the findings of this study provides evidence that consumption taxes are progressive.

References

- Alvarez, Y., Burbidge, J., Farrell, T., Palmer, L., Optimal Taxation in Life Cycle Model, *Canadian Journal of Economics*, V.25, N.1, (1992).
- Ando, A., Modigliani, F., The Life Cycle Hypothesis of Saving: Aggregate Implications and Tests, *American Economic Review*, V.53, N.1, 55-84, (1963).
- Brashares, E, Speyrer, J ve Carlson, G. Distribution aspects of a federal value-added tax, *National Tax Journal*, c.41, 154-174. (1988)

- Brown, C.V. and Jackson, P.M. *Public Sector Economics*, Blackwell, Oxford. (1990)
- Caspersen, E., Metcalf, G., Is a Value Added Tax Regressive? Annual Versus Lifetime Incidence Measures, *National Tax Journal*, V.47, N.4, 731-46, (1994).
- Chamley, C., Optimal Taxation of Capital Income in General Equilibrium With Infinite Lives, *Econometrica*, V.54, N.3, 607-622, (1986).
- Connolly, S., Munro, A., *Economics of the Public Sector*, Prentice Hall, London, (1999).
- Erosa, A., Gervais, M., Optimal Taxation in Life Cycle Economies, *Journal of Economic Theory*, V.105, N.2, 338-369, (2002).
- Fennel, L.A., Hyperopia in Public Finance, ed: Mccaffery, E.J., Slemrod, J., *Behavioral Public Finance*, Russel Sage Foundation, New York, (2006).
- Fullerton, D ve Rogers, D.L Who bears the lifetime tax burden?, The Brooking Institute(1993)
- Güran, M.C. and Oğuz, S. The New Developments in Public Economics and Directions For Future, *Maliye dergisi*, s.158, 75-102 (2010)
- Jenkins G.P., Jenkins, H ve Kuo, K Is the Value Added Tax Naturally Progressive? Queen's Economics Department Working Paper No. 1059 (2006)
- Metcalf, G.E., Fullerton, D., *The Distribution of Tax Burdens: An Introduction*, NBER Working Paper, n.8978, (2002).
- Metcalf, G.E., The Lifetime Incidence of State And Local Taxes: Measuring Changes During The 1980s, ed: Slemrod, J., *Tax Progressivity and Income Inequality*, Cambridge University Press, Cambridge, (1996).

- Modigliani, F., Brumberg, R., *Utility Analysis and The Consumption Function: An Interpretation Of Cross-Section Data*, ed: Kurihara, K.K., *Post-Keynesian Economics*, Sage, London, (1954).
- Musgrave, R.A. *Public Finance in Theory and Practice*, Mcgraw-Hill, London(1976)
- Musgrave, R.A., Case, K.E., Leonard, H., *The Distribution of Fiscal Burdens and Benefits*, *Public Finance Quarterly*, 2, 259-311, (1974).
- Pechman, J.A., *Who Bears The Tax Burden?*, Brooking Institution, Washington D.V., (1985).
- Poterba, J.M., *Is The Gasoline Tax Regressive?* ed: Bradford, D., *Tax Policy and The Economy*, v.5, MIT Press, Washington, (1991).